

US007185987B2

(12) United States Patent

Tamura

(10) Patent No.: US 7,185,987 B2 (45) Date of Patent: Mar. 6, 2007

(54) PROJECTOR AND PROJECTOR ACCESSORY

- (75) Inventor: Youichi Tamura, Minato-ku (JP)
- (73) Assignee: **NEC Viewtechnology, Ltd.**, Tokyo (JP)
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35

U.S.C. 154(b) by 169 days.

- (21) Appl. No.: 10/960,118
- (22) Filed: Oct. 8, 2004

(65) **Prior Publication Data**

US 2005/0078279 A1 Apr. 14, 2005

(30) Foreign Application Priority Data

Oct. 10, 2003 (JP) 2003-352921

- (51) Int. Cl.
 - **G03B 21/14** (2006.01)
- (52) **U.S. Cl.** **353/42**; 353/122; 345/158

See application file for complete search history.

(56) References Cited

U.S. PATENT DOCUMENTS

6,437,314			Usuda et al
6,575,581 6,598,979			Tsurushima
6,798,403 2002/0101412			Kitada et al
2002/0101412			Chu et al
2004/0239653	A1*	12/2004	Stuerzlinger 345/183

2005/0083301 A1*	4/2005	Tamura 345/158
2005/0270494 A1*	12/2005	Banning 353/42
2006/0183994 A1*	8/2006	Murayama et al 600/407
2006/0195274 A1*	8/2006	Suzuki et al 702/39

FOREIGN PATENT DOCUMENTS

JР	3-210622	9/1991
JP	7-230354	8/1995
JP	2000-222127 A	8/2000
JP	2002-207566 A	7/2002
JP	2002-297119	10/2002
JP	2002/331796 A	11/2002
JP	2002-333314 A	11/2002
JP	2002-351605 A	12/2002

^{*} cited by examiner

Primary Examiner—William C. Dowling (74) Attorney, Agent, or Firm—Sughrue Mion, PLLC

(57) ABSTRACT

A projector for enlarging and projecting the display image on a light valve onto a screen is provided with: an infrared photodetector for photodetecting infrared light that is emitted by an electronic pen that is manipulated on the screen and that is provided with an infrared light emission device and ultrasonic generator; at least two ultrasonic receivers for detecting ultrasonic waves that are emitted by the electronic pen; means for measuring the distance to a screen; and means for supplying coordinate data in which the position of the electronic pen on the screen, which has been calculated based on output of the infrared photodetector, output of the ultrasonic generator, and output of the means for measuring the distance to the screen, has been normalized by the length of a side of a projected rectangular image that has been enlarged and projected.

16 Claims, 4 Drawing Sheets

